Montana Department of Environmental Quality

# CASE STUDY

## Energy Efficiency and Conservation Block Grants

# City of Belgrade

**Project Completion Date**
December 2011

**Project Award**
$173,847

**Utility Incentive**
$6,500

**Estimated Annual Savings**
$10,836

Belgrade's public school district has cut its energy usage and costs with extensive energy upgrades made to its intermediate and middle school complex with a competitive federal award from the Montana Department of Environmental Quality (DEQ).

Located ten miles northwest of Bozeman, Belgrade was one of Montana's fastest-growing cities through the 1990s, and though the rate has slowed, it continues to grow each year. Today the city's population is just over 8,200, making it the largest city in the state not designated as a county seat. Belgrade's public school district includes several elementary schools, an intermediate school for grades 4 through 6, a middle school for grades 7 and 8, and a high school.

BELGRADE INTERMEDIATE SCHOOL

### MORE FOR LESS

Constructed in stages, the Belgrade intermediate/middle school facility is approximately 167,000 square feet and houses classrooms, multi-purpose rooms, administrative offices, and a kitchen. What is now the intermediate school was built over a five-year period, from 1978 to 1983, with the most recent addition completed in 2006. The middle school was constructed in 1992. Student populations for the schools are about 700 and 450 students respectively.

The hot-water boiler plant providing heat to the building consisted of highly inefficient, cast iron boilers in poor condition. Each boiler consumed more than 300,000 BTUs of natural gas. To provide more efficient heating at a lower cost, award funds were used to replace the outdated gravity burners with two condensing boilers with a 95 percent efficiency rating.

ONE OF TWO NEW BOILERS

"We are reaping a very good savings from these boilers," said Richard Tramp, capital projects manager for the Belgrade School District. "The old boilers didn't like to run any colder than 140 degrees. The new ones are more efficient at lower temperatures — right now, they are putting out 125 degree water — so not only are we getting savings from the efficiencies, we're also getting them from running at the lower temperature."

### SUN SAVINGS

Award funds were also used to add eight panels to an existing solar array of 67 thermal collection panels installed in 1983. The system had been designed to first heat the domestic hot water for the building, via a heat exchanged in a 2,500-gallon storage tank, and then supplement the boiler plant. However, although in good working order, the 67-panel system wasn't collecting enough energy to fully use the 2,500 gallon tank. That has changed with the addition of the new panels.

"All of the domestic water is now heated by the solar system. The new panels are much more efficient and are bringing back more BTUs than the other 67 panels, which shows that today's technology is much better," Tramp said.

Tramp continues to make adjustments and expects that the solar array will ultimately deliver even more energy. "I don't know that we'll get enough BTUs to help heat the intermediate and middle school building, but the district has another building close by and we might end up preheating its domestic water as well," he said.

DEQ provided funding for this project through a one-time Energy Efficiency and Conservation Block Grant from the U.S. Department of Energy. No additional funds are expected. Utility funds were provided as a rebate from NorthWestern Energy.